Binary Bracelets UNPLUGGED

Lesson time: 15 Minutes   Basic lesson time includes activity only. Introductory and Wrap-Up suggestions can be used to delve deeper when time allows.

Lesson Overview

Binary is extremely important to the computer world. The majority of computers today store all sorts of information in binary form. This lesson helps to demonstrate how it is possible to take something that we know and translate it into a series of ons and offs.

Lesson Objectives

Students will:

- Encode letters into binary
- Decode binary back to letters
- Relate the idea of storing initials on a bracelet to the idea of storing information in a computer

Teaching Guide

Materials, Resources and Prep

For the Student

- **Binary Bracelet Worksheet**
- **Binary Assessment**
- Pens and Pencils
- Scissors

For the Teacher

- Lesson Video
- This Teacher Lesson Guide
- **Binary Bracelet Worksheet**
- **Binary Assessment**
- Computer for opening or images of an open computer

Getting Started (15 min)

1) Review

This is a great time to review the last lesson that you went through with your class.

2) Vocabulary

This lesson has one new and important word:

Binary - Say it with me: Bi-nare-ee

A way of representing information using only two options

3) Off and On

- If you've written a short message on the board in binary, call the students' attention to it and ask if anyone knows what it is or what it means.
    - o Put the message aside and move on to prepping for the activity.
- You can start by asking the class if they have ever seen inside a computer.
    - o What's in there?
    - o This is a good place to actually show them the inside of a computer (or pictures of the inside of a computer).
- Wires carry information through the machine in the form of electricity.
    - o The two options that a computer uses with respect to this electrical information are "off" and "on."
        - ▪ When computers represent information using only two options, it's called "Binary."
    - o That theme of two options doesn't stop when the information gets to its destination.
- Computers also *store* information using binary.
    - o Binary isn't always off and on.
        - ▪ Hard Disk Drives store information using magnetic positive and magnetic negative.
        - ▪ DVDs store information as either reflective or non-reflective.
    - o How do you suppose we can convert the things we store in a computer into binary?
        - ▪ Let's start with letters.
        - ▪ Use the **Binary Decoder Key** to show how a computer might represent capital letters.
            - ▪ **This is a good time to mention that each spot where you have a binary option is called a "binary digit" or "bit" for short.**
            - ▪ **Ask if anyone knows what a grouping of eight bits is called** (it's a byte.)
        - ▪ Go over a few examples of converting letters into binary, then back.
        - ▪ Afterward, write an encoded letter and give the class a few seconds to figure out what it is.

- When the class can figure out your encoded letters on their own, you can move on to the activity.

Activity: (20 min)
4) Binary Bracelet Worksheet

Lesson Tip

You know your classroom best. As the teacher, decide if students should do this individually or if students should work in pairs or small groups.

This lesson is intended to be a fun introduction to how computers store information, not a frustrating lesson in bases.

Directions:

1. Find the letters of your name in the Binary Decoder Key.
2. Fill in the squares of the provided bracelet to match the pattern of the squares next to the letter that you selected.
3. If you are skyping, share your bracelet with your skype friends to see if they can figure out your name.
4. Cut the bracelet out.
5. Tape the bracelet around your wrist to wear it!

Letter	Code		Letter	Code
A	■□■■ ■■■□		N	■□■■ □□□■
B	■□■■ ■■□■		O	■□■■ □□□□
C	■□■■ ■■□□		P	■□■□ ■■■■
D	■□■■ ■□■■		Q	■□■□ ■■■□
E	■□■■ ■□■□		R	■□■□ ■■□■
F	■□■■ ■□□■		S	■□■□ ■■□□
G	■□■■ ■□□□		T	■□■□ ■□■■
H	■□■■ □■■■		U	■□■□ ■□■□
I	■□■■ □■■□		V	■□■□ ■□□■
J	■□■■ □■□■		W	■□■□ ■□□□
K	■□■■ □■□□		X	■□■□ □■■■
L	■□■■ □□■■		Y	■□■□ □■■□
M	■□■■ □□■□		Z	■□■□ □■□■

Wrap-up (5 min)
5) Flash Chat: What did we learn?

- What else do you think is represented as binary inside of a computer?
- How else might you represent binary instead of boxes that are filled or not filled?
- What was your favorite part about that activity?

Assessment (15 min)
7) Binary Assessment

- Hand out the assessment worksheet and allow students to complete the activity independently after the instructions have been well explained.